UNITED STATES PATENT AND TRADEMARK OFFICE

D

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/759,052	01/20/2004	Ta-Wei Lin	MR1957-449/CIP	6706

4586 7590 12/10/2007
ROSENBERG, KLEIN & LEE
3458 ELLICOTT CENTER DRIVE-SUITE 101
ELLICOTT CITY, MD 21043

EXAMINER	
CHENG, PETER L	

ART UNIT	PAPER NUMBER
2625	

MAIL DATE	DELIVERY MODE
12/10/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/759,052	LIN, TA-WEI
	Examiner	Art Unit
	Peter L. Cheng	2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because:

- The applicant may choose to implement the following suggestions; for example, **page 14, line 5 (**change "the parameter" to "a parameter"**); page 14, line86 (**change "in a predetermined level" to "at a predetermined level"**);**

Correction is required. See MPEP § 608.01(b).

2. The disclosure is objected to because of the following informalities:

- The applicant may choose to implement the following suggestions; for example, **page 1, line 4 (**change "U.S. application" to "U.S. patent application"**); page 1, line 5 (**change "filed on 1 Sept. 2000 and" to "filed on 1 Sept. 2000, now abandoned and"**); page 1, lines 5 – 6 (**change "method for calibrating color image scanners" to "Method for Calibrating Color Image Scanners"**); page 2, line 6 (**change "normal image" to "conventional image"**); page 2, line 7 (**change "while color" to "white color"**); page 2, lines 9 – 10 (**change "Therefore, it is easily to adjust ..." to "Therefore, one can easily adjust ...", or similar wording**); page 2, line 11 (**change "of related" to "of the related"**); page 2, line 15 (**change "In some extent" to "To an extent" or "To

some extent", or similar wording); **page 2, line 17** (suggest re-writing "the error for each primitive color can't be response correctly"); **page 2, line 18** (change "even a color" to "even when a color"); **page 2, line 19** (change "of output" to "of the output"); **page 3, lines 7 - 8** (change "the parameter" to "a parameter"); **page 3, line 11** (change "in a" to "at a"); **page 3, line 22** (change "the parameter" to "a parameter"); **page 4, line 2** (change "in a" to "at a"); **page 4, line 20** (change "complied with" to "in compliance with", or remove "complied"); **page 4, line 21** (change "a operative" to "an operative"); **page 5, line 21** (change "tree" to "three"); **page 5, lines 24 – 25** (change "are not necessary to be" to "need not be"); **page 5, line 25** (change "not necessary to be" to "need not be"); **page 6, line 13** (change "complied with" to "in compliance with", or remove "complied"); **page 7, line 5** (for clarity, it is suggested that "summing and averaging" be modified to include what is being summed-up and averaged); **page 7, line 6** (change "calculating averaged compensating value for scanning" to "calculating an averaged compensating value for scanning as described in more detail below", or similar wording"); **page 7, line 8** (for clarity, it is suggested that "scanning and compensating" be modified to include what is being scanned (e.g., "an image") and compensated (e.g., "the converted RGB data")); **page 7, line 9** (change "a operative" to "an operative"); **page 7, line 11** (change "and current" to "and the current"); **page 7, line 13** (change "includes following" to "includes the following"); **page 7, line 15** (change "If positive" to "If it exceeds"); **page 7,**

line 20 (change "If positive" to "If v is in the maximum region"); **page 8, lines 5 – 6** (change "That results from properties of filter lens or light source" to "This is due to the properties of the filter lens or the light source", or similar wording); **page 8, lines 6, 10, 17** (change "sensing values" to "sensed values"); **page 8, line 17** (change "of black color" to "of the color black"); **page 8, line 16** (change "real colors, C1, C2, C3 ..." to "real colors, and C1, C2, C3 ..."); **page 8, line 17** (change "(these values are the sensing values of black color)" to "when the real color is black", or similar wording); **page 9, line 5** (change "reverse" to "inverse");

- **Page 7, lines 11 - 12:** it's not clear why the parameter "d" is referred to as an "adjusted *volume*"; perhaps, a different term should be used; for example, the parameter "d" appears to be a "gain adjustment value";

Appropriate correction is required.

Claim Objections

3. Claim 1 is objected to because of the following informalities:

- **Page 11, line 13:** for clarity, it is suggested that "summing and averaging" be modified to include what is being summed-up and averaged;

- **Page 11, line 15:** for clarity, it is suggested that "scanning and compensating" be modified to include what is being scanned (e.g., "an image") and compensated (e.g., "the converted RGB data");

4. Claim 2 is objected to because of the following informalities:

- **Page 11, line 17:** for clarity, it is assumed that applicant intended to cite "an image sensor" instead of "a image sensor";

5. Claim 5 is objected to because of the following informalities:

- **Page 12, lines 1, 3, 7:** it's not clear why the term "adjusted *volume*" is used; perhaps, a different word should be used; for example, this term appears to be a "gain adjustment value";

- **Page 11, line 15:** for clarity, it is suggested that "scanning and compensating" be modified to include what is being scanned (e.g., "an image") and compensated (e.g., "the converted RGB data");

6. Claim 6 is objected to because of the following informalities:

- **Page 12, lines 11, 16, 17:** as with the specification, suggest changing "sensing values" to "sensed values";

- **Page 12, line 17:** for clarity, suggest changing "and real value, C1, C2, C3 ..." to "and real value, *and* C1, C2, C3 ...";

7. Claim 8 is objected to because of the following informalities:

   - **Page 13, line 3:** as with the specification, suggest changing "reverse function" to "inverse function";

Appropriate correction is required.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 1 – 4 and 6 - 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over **BUSHAW [US Patent 4,408,231]** in view of **HOUSTON [US Patent 6,442,497 B1]**.

As for claim 1, BUSHAW teaches a method for calibrating a color image scanner, comprising:

scanning a white region of a calibration chart

[BUSHAW teaches a method of adjusting a variable gain amplifier in a scanner, and cites, "The calibration of the lamp 10 and the variable gain amplifier 12 takes places while the CCD linear image sensor 18 is sensing reflected light from a white reference strip 20"; **col. 2, lines 63 - 66];**

reading first data

[BUSHAW teaches that the "first data" corresponds to a "maximum white level" which is read from the white reference strip, and cites, "During calibration, gate 28 is set to pass the maximum white signal level detected by white follower 30 to the A/D converter 16. White follower 30 monitors the amplified video signal from DC restore 26 and stores the maximum white level from the time segmented video signal"; **col. 3, lines 32 - 37];**

converting the first data to first ~~R.G.B~~. value

[BUSHAW refers to the maximum white level as a "white peak signal" and cites, "The white peak signal after it is digitized by A/D converter 16 is passed to the microprocessor 14 via the input register 32"; **col. 3, lines 39 - 41];**

amplifying a maximum value in each pixel to a predetermined region

[BUSHAW cites, "With the video signal at the saturation level, processor 14 controls the digital variable gain amplifier to adjust the 100% video signal to 100% range of the A-D converter 16"; **col. 6, lines 15 - 18];**

adjusting gain

[When sensing the "white peak signal", BUSHAW teaches a method of incrementally adjusting the variable gain amplifier until the converted analog-to-digital value reaches the "100% range of the A-D converter"; **col. 6, lines 15 – 18.** During this adjustment process, "microprocessor 14 tracks the gain of the amplifier 12 by storing a software gain DAC value at the same time it outputs an identical hardware gain DAC value to gain register 24. Thus, the incrementing operation is performed by microprocessor 14 by incrementing the software gain value and updating the hardware gain value in gain register 24"; **col. 10, lines 51 - 57];**

However, BUSHAW does not specifically teach "first data" being "RGB data". In BUSHAW's scanner, the CCD is a single channel "linear array sensor containing 1728 useable photosensitive elements"; **col. 3, lines 3 – 4.**

Even though a 3-channel CCD containing separate linear array sensors for red, green and blue is not the same as a single-channel CCD (e.g., a 3-channel CCD produces three times as much pixel data when compared to a single channel CCD and has red, green and blue filters for each linear array), the basic processing of each channel's pixel data from an analog value to a digital value would have been similar as for a single-channel CCD. As such, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the variable gain amplifiers for a CCD containing 3 linear arrays (i.e., one for each of 3 color channels – red, green and blue) in a similar manner as taught by BUSHAW.

In addition, BUSHAW does not teach the following color correction process of

> **scanning a color region of the calibration chart;**
>
> **reading second data;**
>
> **converting the second data to second R.G.B. value;**
>
> **summing and averaging;**
>
> **calculating averaged compensating value for scanning;**

HOUSTON teaches a method of calibrating a color scanner. With reference to **FIG. 1** and **FIG. 2**, HOUSTON teaches a conventional method of

> **scanning a color region of the calibration chart**
>
> ["The calibration patches 118 on the calibration strip 116 are scanned in the film scanner 124"; **col. 3, lines 43 – 44.** "The calibration strip 116 includes a plurality of identification frames (18-24), a plurality of color patches ... and a plurality of neutral patches"; **col. 3, lines 52 - 55];**
>
> **reading second data;**
>
> **converting the second data to second R.G.B. value**
>
> [A "set of scanner densities 126" is produced when the calibration patches are scanned by the film scanner; **col. 3, lines 44 - 45];**
>
> **summing and averaging;**
>
> **calculating averaged compensating value for scanning**
>
> ["The scanner densities 126 and the reference printing densities 122 are regressed in a digital computer 128 to produce the scanner calibration matrix M"; **col. 3, lines 45 - 47];**

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of HOUSTON with those of BUSHAW to calibrate a scanner. BUSHAW teaches an initial step of calibrating the CCD sensor and adjusting

the channel signal gains to maximize the use of the range of the analog-to-digital converter. HOUSTON teaches a subsequent step of generating a "calibration matrix M" that corrects the color values sensed by the scanner.

and scanning and compensating.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the color scanner (i.e., "scanning") and correct the scanner RGB values by use of the "calibration matrix M" (i.e., "compensating").

Regarding claim 2, BUSHAW further teaches the method as claimed in claim 1, wherein

the first or second data is accessed by using an image sensor

[BUSHAW teaches that the "first data" is accessed by a "CCD linear image sensor" **18** in **Fig. 1].**

Regarding claim 3, BUSHAW further teaches the method as claimed in claim 1, wherein

the first or second data is converted to the first or second ~~R.G.B.~~ value by using an analog / digital converter (A/D converter)

[BUSHAW teaches the conversion of "first data" by an "analog-to-digital converter" **16** in **Fig. 1.** As noted for claim 1, BUSHAW does not specifically teach that "first data" is "RGB data". However, as previously noted, it would have been obvious to one of ordinary skill in the art at the time the invention was made

to apply an analog-to-digital converter to the separate red, green and blue channels in the same manner as for a single-channel sensor.**]**.

Regarding claim 4, BUSHAW *does not specifically teach* the method as claimed in claim 1, wherein

the pixel is represented by 8 bits and the maximum value is set within 250-255

[BUSHAW's analog-to-digital converter has 7 bits instead of 8 bits. BUSHAW cites, "There are 128 levels in the A-D converter 16. Thus, the hexadecimal 7F represents the <u>maximum value</u> from A-D converter 16"; **col. 9, lines 62 – 64.**

Applicant's requirement of an 8-bit digital value and a maximum within 250 – 255 is a design choice. With a 7-bit analog-to-digital converter, BUSHAW teaches the same concept as taught by the applicant. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply BUSHAW's teachings to an 8-bit converter by setting the maximum value to be 255**]**.

Regarding claim 6, BUSHAW *does not specifically teach* the method as claimed in claim 1, wherein the step of calculating averaged compensating value is performed by using a relation between a sensing value (R, G, B) and a real value (r, g, b), the relation is:

$$R = a_{11} * r + a_{12} * g + a_{13} * b + C_1 \ldots\ldots. (1)$$

$$G = a_{21} * r + a_{22} * g + a_{23} * b + C_2 \ldots\ldots. (2)$$

$B = a_{31} * r + a_{32} * g + a_{33} * b + C_3$ ……. (3)

wherein a_{IJ} (I, J = 1, 2, 3) are relative coefficients between the sensing value

and real value *and* C_1, C_2, C_3 are minimum values of the sensing value.

However, as noted for claim 1, HOUSTON teaches a "matrix M" that relates the "real values" (i.e., "reference printing densities" **122** in **Fig. 1**) with "sensed values" (i.e., "scanner densities" **126** in **Fig. 1**). Such a "matrix M" would typically be an "inverse matrix" of a matrix containing coefficients $\mathbf{a_{IJ}}$.

In BUSHAW's implementation, "another amplifier 26 ... restores the DC level of the video signal to a predetermined level. The predetermined level is the zero input level of the analog-to-digital (A/D) converter 16. *This is one factor in insuring that the maximum range of A/D converter 16 will be available to digitize the amplified video signal*"; **col. 3, lines 16 – 22.** This "zero level" corresponds to the "minimum sensed value". Since this "DC restore 26" function occurs before the analog-to-digital conversion, the "matrix M" (or its inverse) relating sensed values (R, G, B) with real values (r, g, b) is all that is necessary; the minimum sensed values C_1, C_2 and C_3 are not "passed on" to the analog-to-digital converter.

If the "DC restore 26" function *were not* available, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include minimum sensed values C_1, C_2 and C_3 for red, green and blue, respectively, in the color correction process. Note that including minimum sensed values C_1, C_2 and C_3 may prevent the entire range of the analog-to-digital converter from being used effectively.

Regarding claim 7, BUSHAW *does not specifically teach* the method as claimed in claim 6, wherein the equations (1) - (3) are expressed via matrices as following:

$[R, G, B]^T = A[r, g, b]^T + C$ .... (4)

wherein matrices A and C are written as:

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \quad C = \begin{bmatrix} c_1 \\ c_2 \\ c_3 \end{bmatrix}.$$

Equation (4) above is simply the *equivalent* matrix notation of equations (1) to (3). It would have been obvious to one of ordinary skill in the art at the time the invention was made to re-write equations (1) to (3) in matrix notation as this format is typically used to solve simultaneous equations.

Regarding claim 8, BUSHAW *does not specifically teach* the method as claimed in claim 7, wherein the step of scanning and compensating is performed by using a reverse function of equation (4) as:

$$[\, r, g, b \,]^T = A^{-1} ([\, R, G, B \,]^T - C)$$

whereby the real value (r, g, b) is obtained.

Note that this equation is a derivation of equation (4) cited in claim 7; the difference being that the "real values" (r, g, b) are calculated by means of an inverse matrix $\mathbf{A}^{-1}$.

However, as noted for claim 1, HOUSTON teaches a "matrix M" which relates the "real values" (i.e., "reference printing densities" **122** in **Fig. 1**) with "sensed values" (i.e., "scanner densities" **126** in **Fig. 1**). Such a "matrix M" would typically be an "inverse matrix" of a matrix containing coefficients $\mathbf{a}_{IJ}$; that is, "matrix M" would correspond to the inverse matrix, $\mathbf{A}^{-1}$.

Also, as noted for claim 6, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include minimum sensed values C_1, C_2 and C_3 if a "DC restore 26" function were not implemented.

11. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over **BUSHAW**

[US Patent 4,408,231] and **HOUSTON [US Patent 6,442,497 B1]** in view of **ISHIMA [US Patent 5,101,281]**.

Regarding claim 5, BUSHAW further teaches the method as claimed in claim 1, wherein the step of adjusting gain further comprises:

checking if a current pixel value exceeds the maximum value;

subtracting ~~an adjusted volume~~ *a gain adjustment value* from a current gain value when the current pixel value exceeds the maximum value [BUSHAW teaches a variable gain offset determination process in **col. 9.** The currently measured pixel value corresponds to the "white follower value" (WF); **col. 9, line 65.** This pixel value is compared with the maximum value (hexadecimal 7F); in the flowchart, this step is shown as "IF WF < X'7F'". When the pixel value is not less than this maximum value, and the gain DAC value is greater than 0 (shown as, "IF GAIN DAC > 0"), the current gain value is decremented by one (i.e., a "gain adjustment value"); **col. 10, lines 65 - 67];**

adding the ~~adjusted volume~~ *gain adjustment value* to the current gain value when the current pixel value is smaller than or equal to the maximum value [When the pixel value is less than the maximum value, and the gain DAC value is less than its maximum value (hexadecimal 7F; **col. 9, lines 67 – 68**; this comparison is shown in the flowchart as "IF GAIN DAC < X'7F'"), the current gain value is incremented (by a "gain adjustment value"**];**

However, BUSHAW does not specifically teach

> **checking if a sensed pixel value is in the predetermined region,**
>
> **and adjusting the ~~adjusted volume~~ *gain adjustment value* <u>*according to difference between the maximum value and sensed pixel value*</u>.**

ISHIMA teaches an automatic gain control circuit for an image reading apparatus and a method of adjusting the gain by calculating an error or difference between the maximum value and the sensed pixel value. As shown in **Fig. 1A,** "This automatic gain control circuit 10 generally has a variable gain amplifier 1, a white signal detect/hold circuit 2 and an error amplifier 3"; **col. 1, lines 22 – 25.** "An output signal of the detect/hold circuit 2 is compared with a predetermined reference signal by the error amplifier 3, and with a resulting error signal represented by an error or <u>difference between the reference signal V_0 and the output signal voltage V_I of the detect/hold circuit 2</u>, the amplification by the variable gain amplifier 1 is automatically adjusted"; **col. 1, lines 51 – 57.**

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of ISHIMA with those of BUSHAW and HOUSTON to provide a feedback error (or difference) value for controlling the variable gain so that the gain could be adjusted in less time.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter L. Cheng whose telephone number is 571-270-3007. The examiner can normally be reached on MONDAY - FRIDAY, 8:30 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, King Y. Poon can be reached on 571-272-7440. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

plc
December 4, 2007

KING Y. POON
SUPERVISORY PATENT EXAMINER